

DATA BRIEFS...

○ **Wanted... would-be microkid tycoons.** Youngsters are challenged to conceive and design creative money-making uses for computers in the "Kids, Money & Computers" contest sponsored by Verbatim, the floppy disk manufacturer. Junior (up to 14 years) and Senior (15-18 years old) category entries will be accepted through December 1, 1984. Winners, selected by a panel of Silicon Valley business leaders, will be awarded the title of "Computer Biz Kid" and a complete Commodore 64 computer system worth about \$1,000. Contest kits, including instructions for preparing a business plan for submission can be obtained from *Junior Achievement* chapter offices across the country or write: *Kids, Money & Computers, 4920 El Camino Real, Los Altos, CA 94022.*

○ **How much do students know about computing?** The first national test of students' familiarity with computers will be given in 1985 to 35,000 fourth-, eighth- and 11th-graders as part of the National Assessment of Educational Progress. Students will be asked about word processing, simulation, models, graphics, music generation, telecommunications, programming — in their choice of Basic, Pascal or Logo.

○ **Show me the way to go home?** That's not necessarily the primary purpose of the Highway Geofile system, but if you're in doubt as to which way to go, the package *acquaints you with every* interstate and major road in the lower 48 states and the District of Columbia. The digitized cartographic database contains over 40,000 locations and 60,000 road links between them. It is marketed with the *Geomarketing System, Inc.*, 204 Andover St., Andover, MA 01810. 617/470-3760.

○ **How to computerize your accounting** is a free, eight-page booklet designed to help small business owners decide whether to computerize their accounting functions, and what features to look for in a software program. The booklet is available at many software stores, or by calling *Dow Jones Software, 800/441-5566* in (continued on page 6)

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For Your Eyes Only ENCRYPTION

Sooner or later every microcomputer owner worries about the security of his or her data and programs. This concern is well founded. After all, if your computer and diskettes are located where anyone can use them, the possibility exists that someone will tamper with them and alter their information, either inadvertently or willfully. Even if no one you know would willfully destroy your data, there may be files which you would rather keep private.

Two of the most common methods of ensuring file integrity are: installing a lock to physically prevent the system from being turned on, or locking up the

diskettes in a safe place — generally a cabinet or a desk drawer.

Either method is viable in a corporate or institutional office environment. But what if neither the diskettes nor the computer may be locked up because other users need access to them? What if you only want to protect your files while they are being transferred across telephone lines via telecommunications?

The solution is *encryption*, coding your information for secrecy. If you encrypt your data, only those who have the requisite password will be able to

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COMPUTERS THAT HEAR YOU SPEAK

PART II

The principles of making your computer listen to your words and act upon them have been well understood since the 1960s. High costs have, however, slowed their implementation to a near crawl until today. Technological enhancements are now bringing the cost of new voice recognition systems well below the \$1,000 level. In the process, these systems are becoming affordable for most personal computer users.

Beyond the Dragon

Typical of the new low-cost voice recognition systems is the Dragon Mark II (see Part I, October issue). Based on proprietary algorithms rather than

costly hardware, it is now being incorporated into new computers, and also into products, priced just below \$300, which add voice recognition capabilities to computers. It is hardly likely that the Dragon system will remain alone in its price range. Expect prices to continue to decline and the number and variety of voice input products to soar as voice recognition's cost becomes increasingly justifiable for use in the office and in the home.

Currently, the lowest-priced of the new voice recognition systems is the \$129.95 Chirpee (for Atari 800, Apple

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Computers That Hear You Speak

(continued)

IIe and II+, Commodore 64 and IBM PC computers) from Eng Manufacturing. Chirpee analyzes voice signals for just two variables, corresponding to up and down-slopes in their waveforms. Other systems scan waveforms several thousand times per minute to generate a 12 to 16-channel band.

According to Mark Shaw, Eng vice president of engineering, Chirpee requires neither expensive high-speed processors, nor extensive storage — about 1000 bytes for eight spoken words vs. 64,000 or more in conventional systems channel band. Reducing the extent of voice signal analysis, however, also means reducing accuracy. For instance, sound-alike words, such as *cat* and *rat* are hard for the system to tell apart. Although Chirpee's accuracy rate may only approach 90%, Shaw believes that it is satisfactory for the price-conscious consumer market.

Costlier systems generally claim accuracy rates in the 98% to 99%+ range. Among these under \$1,000 systems are two boards for IBM and compatible PCs: the Microphonics Oto-I (\$845 basic price) and the Audo Pilot 1000 (\$459). The former is claimed to have a 98% accuracy rate. Its vocabulary, in 128-word groups, is limited only by available storage. Sound-alike words can be assigned to different groups for improved accuracy.

Audo Pilot fits into half-sized expansion slots and can turn your computer into a digital recorder. It stores voice messages for later playback at rates of 2K, 4K or 8K bytes/second. A pop-up menu screen system supports the voice recognition capability. Commands, in sets of 32 words, can be readily programmed by users for most application programs.

Things to come

More powerful speaker-dependent voice recognition systems whose vocabularies will not be limited to successive sets of 128 words or less may show up in 1985. There is among them the much anticipated Kurzweill VAT (Voice-Activated Typewriter) with a 10,000-word vocabulary and a 150

words-per-minute processing speed. Another possibility is IBM's own 5,000-word entry, under way for the past 10 years. These could make free-form dictating to a word processor a reality. However, it remains to be seen whether they will be affordable — initially at least — by more than a few Fortune 500 users.

The prospects are that, through to 1989, major initial applications will be control productivity software. Voice input will then replace long strings of key commands by single utterances, as in this example for VisiCalc:

utterance	key command
Epson	:/P Return - "CO
Fifth Week	Return 023 Return :CHCHCHCHCH

You will be able to talk a Framework, Symphony or Top View package through its paces. "Doing it by speech," comments Dr. Janet Baker, co-founder of Dragon Systems, means "you don't have to remember a lot of format commands or character sequencing — only what you want to do and the function you want to perform."

Don't be surprised if, at first, voice input encounters a corporate culture barrier — some will find it hard to talk to a machine. Also, speech demands relative quiet and privacy — hard to find in many offices. Widespread use of voice to control business software may have to wait for better soundproofing of office workstations.

The most far-reaching use of low-cost voice recognition devices will be in the home. The \$2,000-plus price of existing voice input home control systems, such as At Home With Computer's HCI-1 and Artra's Waldo, will be slashed. Lower-cost systems will be voice-enhanced so that home lighting, security and appliances can be controlled with spoken commands. They will be able to tell you the time, the weather, when your favorite TV show comes on — all at your spoken request.

The most visible gainer, at home as well as in school, may be education. Kids have few hang-ups about talking to a CRT screen. Voice input provides true interactivity for learning, particularly for young children who are not yet adept at using keyboards. At school, each student can have his or her voice pattern stored in the computer for personal identification and session-to-session follow-up.

Innovations, however, can go only so far. Continuing progress in developing cost-effective voice-recognition applications will require a new generation of faster, more powerful microprocessors

— which is expected by 1988. These could, for instance, be used for a current IBM project to permit users to dictate letters and memos to a computer, using a 5,000-word stored vocabulary. This system has already been successfully demonstrated on a \$1.5 million mainframe. The job ahead is to get the system into a desktop machine at an affordable price.

New chips should also be far less expensive — say \$5 vs. \$55. At this price, voice recognition capability can be incorporated into a broad variety of non-computer devices. Voice input has already been demonstrated for peripheral applications in automobiles (e.g., "How much gas is left in the tank?"). Although the reception in this country has been mixed, the welcome in Japan was enthusiastic. Voice input has also spread to telephones devices such as the Unitech answering machines and the Audec Command Dialer. And in Neuchatel, Switzerland, Asulab is reportedly developing a wristwatch with a 15-word vocabulary for setting time, alarm, stopwatch, etc. But these current incorporations are in exceptionally expensive devices. New chip designs and economies of mass production could trigger the development of powerful \$5 voice recognizers that could be incorporated into standard home equipment and appliances from saunas to toasters and TVs.

And yet further beyond

The technology for recognizing single words spoken by a "known" speaker recorded on a speech template is well understood. Cost now remains the chief obstacle. But speaker-dependent voice input systems are, at most, only a halfway point. Gleaming on the high-tech horizon is speaker-independent *continuous speech*, and the device to implement it — the voice-actuated dictating typewriter.

Continuous-speech, speaker-independent systems already exist but their vocabularies are very limited (not much more than 100 words). Their cost, running into tens of thousands of dollars, is excessive for all but specialized applications where cost is secondary. Accuracy, too, is restricted. Designed to understand everyone, they cannot understand anyone quite as well as systems with personalized voice templates. For instance, it is harder for them to distinguish the some 40 phonemes, the basic speech elements in the English language.

Some researchers believe that artificial intelligence is needed to understand the meaning and context of what is said and to predict what comes next. Others propose dynamic programming that

Baron's MicroComputing Reports (ISSN 0746-598X) is published 12 times a year, monthly, by Computer Information Resources, at 344 East 49th Street, New York, NY 10017. \$39.95/yr. (Canadian and foreign, add \$5.00.) Second class postage paid at New York, N.Y. and at additional mailing offices. Copyright © 1984 by Computer Information Resources. Reproduction in whole or in part without permission is prohibited. POSTMASTER: Send address changes to Baron's MicroComputing Reports, P.O. Box 305, Dover, NJ 07801.

would subject word elements to a far more complex analysis than current template matching techniques can do.

Dynamic programming is the most successful software-based approach to continuous speech recognition to date. However, it requires a vast increase in computations. George M. White, Chief technical officer of Koala Technologies, estimates that instructions-per-second execution rates must improve by a factor of 100 before a voice-actuated typewriter capable of accepting normal speech becomes possible. *

Progress in developing continuous speech recognition has been very gradual so far. A start has been made in the recognition of short *connected word* (without pauses between words) passages. Experimental projects for recognition of vastly greater vocabularies are reportedly in progress at M.I.T. Most researchers agree with George White's forecast of the coming of the dictating typewriter. "Not before 2,001," he says.

Yet, there also are those who believe that as voice recognition technology achieves profitability, heavier research expenditures and the entry of new startup firms will speed progress. In any event, 2001 is less than 17 years away.

VOICE RECOGNITION ROUND-UP

• **ACT Apricot Portable computer** — has a vocabulary of 4,096 words, 64

words at a time. \$2,700 to \$3,200. *ACT Computers (North America), Inc.*, 3375 Scott Blvd., Santa Clara, CA 95051. 408/727-8090.

• **Auto Pilot 1000** — voice storage and playback/voice recognition system on half-size board for IBM PC and compatibles. Vocabulary in 32-word sets. \$549 (without microphone). *Auto Pilot*, 516 Walt Whitman Rd., Huntington, NY 11746. 516/351-8616.

• **Chirpee** — phonetic-based voice recognition system for Atari 800, Apple IIe and II+, Commodore 64 and 4Plus, and IBM PC. \$129.95. *Eng Manufacturing, Inc.*, 4304 W. Saturn Way, Chandler, AZ 85224. 602/961-0165.

• **Dragon Mark II speech recognition system** — speaker-dependent, software-based, OEM/system. *Dragon Systems, Inc.*, 55 Chapel St., Newton, MA 02158. 617/965-5200.

• **Introvoice boards** — Apple II boards with microphones and vocabularies for 11 major software packages; Introvoice I, 80-word vocabulary, \$500; Introvoice II, 160-word, \$1,150; Introvoice III for IBM PC, 100-word, \$1,495 with keyboard. *The Voice Connection*, 17835 Skypark Circle, Suite C, Irvine, CA 92714. 714/261-2366.

• **Koala voice recognition products** — business software command system for IBM PC; reading system for preschoolers and software tool kits for Apple II computers (not IIc), \$300 each. *Koala Technologies Corp.*, 4962 El Camino

Real, Suite 125, Los Altos, CA 94022. 415/964-2992.

• **Oto-I** — voice recognition system for IBM PC and compatibles. 128-word set. \$845 (without microphone). *Microphonics Technology Corporation*, 234 S.W. 43rd St., P.O. Box 7458, Renton, WA 98057.

• **Scott Instruments Apple II boards** — Shadow/VET, \$595; VET/2, \$895. *Scott Instruments Corp.*, 815 Elm, Denton, TX 76201. 817/387-9514.

• **Scratchpad with Voicedrive** — spoken command-driven spreadsheet for IBM PC with Tecmar board. \$995. *Supersoft, Inc.*, P.O. Box 1628, Champaign, IL 61820. 217/359-2112.

• **TI Speech Command System Board** and software for TI Professional. \$2,600. *Texas Instruments, Inc.*, Data Systems Group, P.O.B. 402430, H-678, Dallas, TX 75249. 800/527-3500.

• **Vocalink** IBM PC boards — 240-word vocabulary, 128K on-board RAM, microphone. \$1,835. *Interstate Voice Products*, 1849 W. Sequoia, Orange, CA 92668. 714/937-9010.

• **Voice Plus** I/O board — 300-word vocabulary, on-board RAM, to \$1,600. *NEC New Products Division*, 2532 Broad Hollow Rd., Melville, NY. 516/752-9700.

• **VPC 200 voice card** — holds 75-word templates at one time, and responds to 64 voice commands. \$2,450. *Votan, Inc.*, 4487 Technology Dr., Fremont, CA 94538. 415/490-7600.

For Your Eyes Only (continued)

decipher the code and access the text. Without the password to decode the data, the text will appear to be gibberish.

Commerical protection products

Most devices and programs currently marketed to safeguard the integrity of programs and data files use an **encryption program**. Usually the program is based on a randomly-generated algorithm.

In several packages, encryption programs are resident in the firmware — either as add-on boards or on compact devices that connect to one of the computer's ports. The latter are generally better suited for use by individuals or small offices. They are lower in cost than boards (under \$50 versus over \$100), and do not take up any of the computer's limited number of expansion slots. Rather, they connect to one of the ports — usually the serial port — and, because they piggyback (that is, they give what they take by acting as a transparent go-between), they leave the port free.

Other encryption products currently on the market are all software-dependent. Generally, the more expen-

sive the program, the more difficult it is to crack the algorithm. For this reason, it is important that you not forget your password.

Do-it-yourself

There is another way of protecting your data that is almost as effective as using commercial safeguards. It is also far more economical. You can write your own encryption program. It is not particularly difficult, but it does require forethought to keep straight all the elements that make up the program. A program must contain at least three components: the encoder, the decoder, and a password routine to activate it.

Perhaps the easiest way to encode information is to assign to each keystroke the value of a different ASCII symbol. Thus, what is displayed and saved to disk will be different from what you actually keystroke in. For example, you could write a program that reverses the alphabet so that when you press the "a" key, the letter "z" appears.

Naturally, you must keep track of which key relates to which on-screen character or symbol. If not, you will have difficulty or be totally unable to decode the information you encrypted.

Ideally, the program should incorporate the password as part of the encoding routine. To put it another way, the password should become the key on which the text is encrypted. For instance, if the password is "AAA," you can have the computer total the ASCII value of each keystroke, take the last digit, and set the alphabet off by that amount.

Protecting programs

If your disk operating system allows you to write an autoexec file, you can use it to prevent your computer from being booted. Simply type in and save on the system diskette a routine that asks for a password and then loops continuously until the correct sequence is entered.

Password routines can easily be added to commercial software written in BASIC. The routines need not be at the beginning of the program. If you desire, you can specify that access to only a certain portion of your data or software requires a password. However, if the program is compiled, you must get a copy of the source code, make the alteration, and then recompile the program.

The Uses of a Short List

As a knowledgeable computer user, you may frequently find yourself called upon to help various people learn how to use a personal computer. Among them there may be a friend who has just purchased his or her first micro; your employees or co-workers; or your wife, children, or insistent relatives. Whoever they are, your first impulse may be to tell them: "Do what I did — read the manuals." But that ploy rarely succeeds.

Whatever the reasons, a strikingly high number of intelligent people who can function successfully in complex business or other situations, have a block when it comes to mastering the voluminous and often indifferently written documentation that comes with a new computer. Their reactions may be appropriate in view of the time taken away from work or household tasks that exploring a 300-400 page manual requires.

What constructive help can you give in such situations? First of all, you can help set up the equipment. From your own experience, you know how easy it is to get discouraged when you have to hunt for the right cable to hook up the computer and printer. Second, you can install the application programs, first making sure they are properly configured for the hardware. Next, depending on the system, you can minimize the number and scope of decisions that the novice user will have to make. Use

"submit" (CP/M) or "batch" (MS-DOS) files to implement as much of the initial loading and program startup process as possible. True, it reduces the flexibility of the user's operations, but reduced tension and correspondingly improved performance are worth the trade-off.

However, the most useful assistance which you can give is probably to create a *short list* of procedures for accomplishing the most common tasks that must be performed by the computer in question. Such a list will prove a handy resource for the person you are helping.

This list should be based on an analysis of your personal experiences with the computer, and the kind of problems that you yourself have faced.

Don't draw back from including entries which might seem trivial: never take for granted in advance how another person will handle a particular concept or situation. In drawing up this list, avoid technical terms as much as you can. You can mention disk drives, diskettes, screens, etc. But you can do without TPA, DTE/DCE, IEEE-488 and the like.

The reference card or short tutorial that usually comes with the computer is certainly helpful, but it cannot replace the list you will prepare. Typically, it attempts to compress a great deal of diverse information into a very small space. Normally, the manufacturer's reference card or sheet is most useful to

those who are already skilled in using their computer and software.

The essential list

Here is what a typical short list should include. (Entries vary according to hardware and software involved and key applications.) In this case, the list focuses on word processing, the most common microcomputer application. Substitutions can easily be made for spreadsheets, database management, communications, etc. But as a minimum, this list should tell you how to:

- Turn on your computer (in proper sequence if there are several items of equipment, in case of special situations, diskettes in or out of drives, etc.).
- Insert/take out diskettes safely (labels or write protect tabs, baulky disk drive latches, safeguards against magnetic fields, etc.).
- Start the word processing program.
- Start creating a document.
- Move the document around (focusing on the most useful commands).
- Delete, copy, and move portions of text within the document.
- Set the righthand margin and the line spacing.
- Underline portions of text.
- "Save to disk."
- List what's on a disk: files and directory; backup files if created by the word processing program.
- Print a document from RAM or disk.
- Turn the printer on/off, in proper sequence with the computer.
- Determine the likely causes if the

PC \$ TALK

• Cut your printer ribbon costs. Whether you're paying as little as \$3 for an Okidata ribbon or \$9 and up for an Epson cartridge, your printer ribbon expenditures could top \$100 a year. Yet, you could slash your ribbon costs by two thirds or more. Re-inking your spools or cartridges is a relatively easy process using products such as the MacInker re-inker or Ebonize spray ink (see *BMR*, May, 1984 issue).

Another solution is to let someone else re-ink your ribbons. Aspen Ribbons, for instance, will reload a TRS-80 Daisy Wheel II cartridge for \$3.10, or an Epson MX-80 cartridge for \$3.50 (plus shipping). *Aspen Ribbons, Inc., 1170 N. 55th St., Boulder, CO 80301-2796. 800/525-0646.*

Another approach to re-inking which is even cheaper is to use *WD-40*, a light solvent oil which, when squirted inside a cartridge, liquifies ink remaining on the non-impact portions of the ribbons.

This can be done two or three times before the ink is finally exhausted. A small aerosol can with a long nozzle costs as little as \$2.50 in hardware stores. This method, however, does require a great deal of care as the top of the cartridge must be taken off and secured back on without accidentally taking the insides of the cartridge apart.

• For photo pros only. Photographers who purchase a Sony SMC-70 personal computer through December 31, 1984 will receive a free subscription to Photonet, an information and communications network designed specifically for photography, publishing and advertising professionals. The subscription offer, stated to be worth \$100, is available from authorized SMC-70 dealers.

• How to tap into free and low-cost online services is among the topics covered by the *Data Base Informer*, a monthly publication now available on the *NewsNet* network. Other topics include data tapes on science and technology, a comparison of available

legislative databases, and how to get free computer consulting services.

• Free printer interface. An RS232 or Centronics interface option is offered at no cost with the Toshiba P1340 dot matrix printer. Either interface must be factory-installed on the \$995 printer.

• Home computer light pen price slashed. The price of the Tech-Sketch light pen graphics system for Atari and Commodore 64 computers has been reduced from \$69.95 to \$59.95. This is claimed to be the lowest price for a home computer light pen graphics package. The system includes the light pen, which feature a control switch mounted on its barrel and a diskette containing the Micro Illustrator graphics program.

• A PC log for the IRS. Government regulations instituted to implement the provisions of the new Federal income tax bill (H.R. 4710) require you to keep detailed records of your computer runs in order to qualify for tax credits on your personal computer. *Imbolog*, a PC logbook has been published for this

printer doesn't print — and what to do about them.

- Establish, depending on the printer, the significance of the most important printer buttons or switches (on/off line, line feed, form feed, reset, etc.).
- Do "housekeeping" on the disk (using the system utilities, or commands in the word processing program): copying, erasing, renaming a file; logging onto a new disk drive, etc.
- Cope with the most likely disasters.
- "Reset" the computer.
- Exit the word processing program (different circumstances in which you can take out the disks).
- Turn off the computer.

Fleshing it out

The entries shown thus far are designed to help a beginner create a standard document on a computer with a minimum of formatting variances, and to print it out. You may wish to change some, delete others, or expand the list by adding such entries as:

- How to initialize (format) a new disk.
- How to change printer type styles (pica, elite, etc.) and pitches.
- How to "restore" a deleted file, etc.

Be careful not to add too much. Remember the longer the list, the more it resembles a manual, and the less accessible its contents become. Like most quick reference cards provided by computer manufacturers or software publishers, your list can become so comprehensive that it defeats its purpose.

Once the list is created, put each

entry on a separate sheet in a looseleaf notebook and fill in the necessary details. In each case, set down every step of the operation required to perform a given task. Make minimum assumptions concerning the reader's knowledge.

Assume that the notebook's contents may not be studied in sequence. Therefore, each section should be as self-contained as possible, so that solutions to particular problems can be found in a single, appropriate location. You can thus create a highly selective reference guide customized to users' needs. You can go further and refer each section to a passage in the computer manufacturer's manual(s).

Helping yourself

A short list may prove useful not just for neophytes, but also for experienced users. For instance, it provides them with a reference for commands which they use infrequently. It can be particularly useful in the case of a change of computers (especially if this involves a change of operating systems). These users are frequently too busy working at the tasks for which they acquired the new computer to spend much time poring over its manuals. Using a previously assembled checklist, they can quickly go through the tables of contents and indexes of the manuals and pick out the pages with relevant information. They can thus promptly get the computer up and running and then worry about details later at their leisure.

— Henryk Baran

purpose. It includes an introduction to the law and its requirements, weekly, monthly and annual computer worksheets; and the certificates that you are required to give to your tax preparer. The logbook can be ordered (\$14.95 plus \$2.50 shipping and handling) from International Resource Development, Inc., 6 Prowitt St., Norwalk, CT 06855. 203/866-7800. (For a do-it-yourself approach to PC logkeeping for the IRS, see *BMR*, September, 1984 issue.)

- **Buying on the cheap.** Have you thought of buying a used computer and second-hand software directly from the owner? Of course, there are risks. It's up to you to check up what you buy, and you'd be well advised to obtain a money-back commitment from the seller if the hardware or software does not perform as it should within a given period. However, you can purchase a current model computer with a lavish software library for 15% to 30% less than what the lowest-cost discounter (or a dealer who deals in used computers) charges.

Dan Delmar, owner of Comp-Used of Connecticut, (85 Rivergate Drive, Wilton, CT 06897. 800/762-8677 — 1/762-8677 in Connecticut), a matchmaking service for buyers and sellers of used micros, cites typical prices asked by owners — **IBM PC**, over 30% off list price — **Apple IIe**, always in demand but available for 25% off list. (Better prices can be had for **Apple II, II+** and **III**s.) — **Compaq** desktop units range between \$1600 and \$1800 — **Kaypro II**, \$700 vs. \$1295 new. Delmar charges a fee of 6% of the price (3% if over \$5,000) of any programs or equipment sold through referrals from the Comp-Used database.

• **MicroPro WordStar family products** have been substantially reduced in price, with WordStar now retailing for \$350, down from \$495. CorrectStar is now \$145, down from \$195. MailMerge and SpellStar are each priced at \$99. They were \$250 previously. Micropro's price move precedes its introduction of the Ivan integrated system expected by the end of 1984.

INSIDE INFO

◆ The following letter was sent by Daniel J. Costello Jr. of Oak Lawn, Illinois:

Regarding your *Inside Info* column in the September, 1984, issue, you mention that there are only two solutions to the call-waiting interrupt problem — either get two phone lines or drop call-waiting.

For some time now I have been using a third solution. Using the call-forwarding feature to forward the call to another number (say the weather). This solution will not disrupt the modem connection.

The only problem is in explaining to a friend or relative why they keep getting the weather when they call you!

(*BMR* thanks Mr. Costello for his ingenious solution. Subscriber letters which provide non-brand specific help or tips, or clarify particular points concerning enhanced personal computer operations will be considered for inclusion in *Inside Info*, space allowing. All letters will be edited.)

◆ How do bulletin boards reduce connection time and charges for users?

Bulletin boards reduce time required to transmit information by using data compression techniques. This saves you, the user, connect time and the resulting phone charges. Use of data compression also enables the Sysop, system operator, to store more programs.

Data compression itself is an umbrella term for the packing, or encryption, of data for file-saving purposes. Although the most common use is in the transmission of files across the phone lines, a number of application programs — especially presentation graphics, video imaging, and voice communications programs — make use of data compression techniques. Naturally, an unpacking program must be run before the downloaded program can be used.

Essentially, packing, or encoding, involves substituting a different value for the data than that provided by ASCII. This substitution can be on a letter-by-letter basis or on a word-and-letter basis. The end result is an uneven bit-length representation, with the most common letters, words or phrases using the smallest amount of bits. For example, since the letter "E" is the most commonly used vowel, it can use the smallest bit representation possible; the same applies for the word "the." Letters and words that are rarely used such as the letter "x" or the word "resolution" can be represented with larger numbers of bits.

Second Computers STM PC

STM PC may not be a true portable (it requires an AC outlet) but, at 17 pounds, it is definitely light enough to transport without too much trouble. The lightweight keyboard fits in a casing that covers the 80-character by 25-line blue, backlit LCD. A vast array of standard features comes with the \$3,499 unit: 256K of RAM (expandable to 512K), two double-density disk drives, a 300-baud modem, a speaker phone, and a 40-column thermal printer which permits 80 columns to be printed on the side. In addition, the system includes one parallel and two serial ports, color and composite video connectors, a telephone jack for the internal modem, an interface for hard disks, and an external bus expansion port. It comes bundled with *NewWord*, a *WordStar*-like word processor.

Advantages

Because the STM PC is based on an Intel 80186 microprocessor and has a clock speed of 8MHz (almost twice that of the IBM PC), it fairly zips through programs which require in-memory processing. Its compatibility is high; the system can run off-the-shelf versions of 1-2-3, *WordStar*, and *Flight Simulator*.

One nice feature is the ability to toggle the display from a monochrome or color monitor to the LCD and vice

versa with the F5 key (extremely handy for booting an Infocom game instead of an application program at work). Other function keys enable you to display STM-specific command key functions, change the display mode, alter the character size, and activate the phone speaker and thermal printer.

Communications

The communications program which comes with the STM PC allows both voice and data transmissions; the former can be used in conjunction with the speaker phone for conference calls. There is even a mute function so that you can hold a conversation in your office without its being overheard by the party at the other end of the line. In addition to autoanswer and autodial features, there is also a redial capability. Some of the parameters which can be set are: auto linefeed, number of data bits, full or half duplex, parity, stop bits, and timing and system answering sequences. Modem operations include sending and receiving files, and conversational mode.

Disadvantages

The STM PC's greatest drawback is its LCD screen. Although it is backlit and offers 25 lines by 80 characters, the cursor, a blinking underline, tends to disappear behind the characters. This

makes editing text extremely difficult. Also, although there is a brightness control, the display is impossible to read at certain angles because of the glare reflected from outside sources. A standard CRT monitor can be added to the system — though, of course, at an extra cost.

It should also be pointed out that the STM PC is not a quiet machine. From the moment it is turned on, it emits a fairly loud hum. Shutting down the system when not in use becomes second nature. Even when the computer goes through its diagnostics, it is noisy because it turns on the speaker phone.

Disk formatting presents yet another drawback. The STM PC formats disks at 96 TPI (tracks per inch). This is double the IBM standard of 48 TPI. While it provides twice the amount of storage (720K versus 360K), it also means that the drive cannot write to IBM diskettes.

Finally, there are no expansion slots available within the system. The cost of an expansion bus should be considered if you wish to use the STM PC as a desktop.

Conclusion

Despite the drawbacks, the STM PC is an excellent IBM-compatible portable. It is easy to carry and provides most of the features you would need on a business trip. If the price were lower, it would be much more attractive. *STM Electronics Corp.*, 535 Middlefield, Suite 250, Menlo Park, CA 94025. 415/326-6226.

DATA BRIEFS... (continued)

California, 800/821-8079 elsewhere.

○ **If you want to be a free-lance programmer**, this may be the professional group for you. The *National Association of Free-lance Programmers* (NAFPL) provides its membership with information about how and where to sell original software. Its monthly *Software Market Letter* includes a directory of software publishers and distributors, and others who buy or license software from free-lance authors. Tax-deductible annual fees are \$58. *NAFPL*, P.O. Box 5797, Bethesda, MD 20814. 301/654-5033.

○ **Incompatible PCs can exchange data**, using the new *Telentry* data communications network. Telentry is designed to transfer documents with word processor code intact so that they can be received in a new word processor code for immediate editing and revision. Transfers are performed through dataDRIVER terminals at each subscriber site which allow word processors or PCs to utilize a proprietary

translation algorithm. The Telentry system will also store documents up to 1,000 pages in length, which can be called up when needed. There are no equipment or initiation charges, only utilization fees which vary according to service priorities. Sending one page anywhere within 30 minutes costs \$1; within four hours, 50 cents; and overnight (delivery by 7:00 a.m.), 30 cents. *Telentry Systems, Inc.*, 2777 Summer St., Stamford, CT 06905. 203/348-5300.

○ **Software store primer**. If you want to run a software store, this book published by a software distributor will show you how. *The Successful Software Store: A Complete Guide to Opening and Operating a Software Store* is a detailed manual for the novice which also includes tips for more experienced entrepreneurs. Included with the \$75 volume is a Lotus 1-2-3 template that retailers can use to factor in store sales and overhead and come with a 12-month profit projection. *First Software Corp.*, 17-21 Ballard Way, Lawrence, MA 01843. 800/343-1290.

○ **Reviews of microcomputer books** from over 100 publishers are available on *NewsNet*. More than 30 reviews are published every other week, and the books are also rated from "A" (outstanding) to "D" (disappointing).

○ **BOR, Borland special interest group** has been formed for *CompuServe* subscribers who are also users of Borland International microcomputer software. They may join either a special programmer's or an IBM PC User's SIG. Membership applications may be sent in directly on line, or by mail. Privileges to SIG members include on-line access to sample Borland programs and the ability to send messages to other Borland software users in the U.S. and in over 42 foreign countries.

○ **Micro Newsletter**, a publication for physicians, dentists and other medical personnel is now available on *NewsNet*. It features reviews and comments on new computer products and developments for the medical office or clinic. It also serves as a monthly forum for computer users.

FREWARE

• **Hinky-Pinky Game** is designed to enrich language skills of children. Players must come up with pairs of rhyming words to match any of 180 intriguing definitions which the program features at three different levels of difficulty. Copy routines, context clues and access to a 6400 word rhyming list are also provided. The game comes with a rhyming dictionary. The charge is \$30 for a master disk, or \$25 if only a validation label is requested. Requires a 48K Apple II+ or IIe and one disk drive. *The 22nd Avenue Workshop, P.O. Box 3425, Dept. F, Eugene, OR 97403.*

• **Atari software library** contains public domain music files for ams play or APX Advanced Music System and Horror Castle text adventure. There is a \$7 donation per disk; \$2 for listing and order form. You can also trade a disk with acceptable unprotected public domain programs or compatible music files for a disk of your choice. *D. Terry Stiglic, Stiglic & Associates, 2160 Eldred Ave., Cleveland, OH 44107.*

• **Volkswriter deluxe** printer configuration tables for Toshiba P1351, 1340 and 1350 printers come with complete instructions and installation software — for IBM PC/XT. Donation of \$15 is suggested from satisfied users. To obtain a free copy of the software, send a formatted 5 1/4" disk in an adequate mailer along with a return mailing label and postage stamps to *R.C. Earougher, 621 North Sixth St., Douglas, WY 82633.*

WANTED... WANTED... WANTED...
Freeware, public domain software announcements for no-charge or suggested-donation software for Apple, Atari, Commodore, IBM, TI, TRS-80, CP/M and MS-DOS computers. Send announcements — including charges or donations, and full address — to *Freeware/Public Domain Software Editor, Baron's MicroComputing Reports, 344 E. 49th St., New York, NY 10017.*

BMR subscribers can now receive monthly reports for more than one make of computer. The charge for this service (which includes first-class mailing of the monthly newsletter with inserts) is \$10/yr. per additional computer make.

Reports are available for:

- Apple
- Kaypro
- Atari
- Osborne
- Commodore
- Texas Instruments
- IBM
- TRS-80

TOOLS AND CONCEPTS

• **More IBM PC clones.** Not a month goes by without the offering of new IBM PC/XT-compatible personal computers being offered to potential users who want to trade up to a 16-bit machine, install another system, or purchase their first computer. Of late, these introductions have been noteworthy for their high level of IBM compatibility. (The IBM BIOS has lost much of its splendid exclusivity.) Among recent announcements are two from Sherry and Tandy Corporations.

• **Tandy 1200 DH** is a clone of the IBM XT featuring a 10M-byte hard disk, a 360K floppy disk drive and 256K RAM, expandable to 640K. It is doubly newsworthy. Its price, under \$3,000, is over 30% cheaper than the XT (even with the 15% discount currently available in most stores). This is also Tandy's first truly IBM-compatible computer. Additional products are expected to follow in 1985. (Meanwhile Tandy is beefing up its support capabilities.) Look for prices to keep on dropping as IBM encounters what may be its first real MS-DOS competition.

• **Sperry Portable Computer** is the latest addition to Sperry's well-regarded family of IBM-compatible personal computers. The Portable has a high-resolution 9-inch screen, up to 512K RAM (640K via an expansion board), and can be integrated into Sperry and IBM processors. Available in three models — SP1 with a single 320K floppy disk drive, \$2,685; SP2 with dual drives, \$3,110; and SPX with one floppy drive and a 10M-byte hard disk, \$4,985.

• **PersonalScanner (EIT-PS)** is an automatic graphic digitizer and text input device which converts drawings, photographs, typewritten documents, and other visual material into electronic files. Developed for use with personal computers, it is claimed to combine the functions of a fax machine, a graphic digitizer, and a copier. The scanner costs \$2,487 and comes with a cable, and a half-size interface card for IBM PC and XT personal computers. Interfaces for Apple and other Motorola 68000-based machines are planned for early 1985. *Electronic Information Technology, Inc., 373 Route 46, West Fairfield, NJ 07006. 201/227-1447.*

• **Enhanced CP/M-80 emulation.** Version 2.0 of 80MATE, a software emulator that allows users of IBM PC and compatibles to run most CP/M-80 programs under MS-DOS, features two enhancements. One is Z-80 processor emulation in addition to 8080 emulation capability. The second adds Apple

CP/M terminal emulation to 80MATE's 80TERM function. This converts the PC's video and keyboard into a CP/M computer for terminal emulation of CP/M-80 environments. 80MATE retails for \$149.50. Users of older versions can upgrade to version 2.0 at nominal cost. *Vertex Systems, 6022 W. Pico Blvd., Ste. 3, Los Angeles, CA 90048. 213/938-0857.*

• **Two from Infocom.** With Christmas drawing nigh, you could give or receive either of these two new interactive fiction releases. Both are available for most Apple, Atari, Commodore CP/M-80, DEC, Data General, H/P, IBM, NEC, Osborne, TRS-80 and Tandy 2000 computers.

The Hitchhiker's Guide to the Galaxy, based on the best-selling novel uses the same characters and locations. Your adventures begin on the Vogon spaceship. \$39.95 for most systems.

Suspect is a mystery novel in which a murder occurs during a masquerade ball at a historic Maryland estate. As a newspaper reporter and prime suspect, you have only a few hours to solve the crime to convince the police of your innocence and to bring back a hot story for your editor. \$44.95 (\$39.95 for Atari, Commodore 64 and Color Computer).

• Printer Enhancers

Calming down your printer is the job of Audio-Technica AT605 Audio Insulators. Originally developed to be placed under phonograph turntables, the chrome and rubber energy absorbers alleviate the "shake, rattle and roll" of computer printers in operation. \$27.95 for a set of four. At high-fi dealers.

"**Printer Buffer**" stores computer data to transmit it to a printer at speeds the unit can handle. Buffer memory is upgradable from 16K to 64K by plugging in memory chips. It is equipped with Centronics parallel connectors. Models with RS232 ports will be introduced later. Prices begin at \$119.95. *Digital Devices Corp., 430 10th St., Suite N205, Atlanta, GA 30318. 800/554-4898; 404/872-4430 in Georgia.*

Keep your computer clean. Two new, low-cost portable vacuum cleaners suck up dust particles, paper shreds and other debris in hard-to-reach crevices inside your PC.

Metro Data-Vac (MDV-1) features an Air Pinpointer with an opening of only a few millimeters wide, a shoulder strap and a variety of attachments. \$60. *MetroVacuum Cleaner Co., One Ramapo Ave., Suffern, NY 10901. 914/357-1600.*

Words Processed

• **The Prentice-Hall Standard Glossary of Computer Terminology.** By Robert A. Edmunds. 489 pages. Prentice-Hall. \$26.95 paper, \$34.95 cloth. This book represents an ambitious attempt to describe and explain the meaning of over 4,000 terms and names applying to computer hardware, software, operations and techniques, and also to some of the principal participants in the computer industry. Definitions are terse and written simply and clearly. The Glossary is a useful reference text. However, its coverage has occasional gaps, particularly where products are concerned. They are perhaps inevitable, considering the sheer size of the subject and the speed at which new developments occur. For instance, Lotus Development Corp.'s recently introduced Symphony integrated system is mentioned, but its rival, Ashton Tate's Framework, is not. Similarly, while Unix is described as a "widely (?) used" operating system, no mention is made of its 16-bit Xenix implementation.

• **Computers for Professional Practice.** By Ellis J. Neiburger, DDS, *Audent, Inc.*, 1000 North Ave., Waukegan, IL 60085-2997. \$15.99, paper. If you are a dentist, doctor, accountant, lawyer or other professional and are about to computerize your business, this book was written with you in mind. Its author is also the editor of the *Dental Computer Newsletter*. He has some useful comments to make about all aspects — hardware, software, and the general "how to" — of computerization for the professional office. Coverage extends to such obscure but useful considerations as tool kits for in-office repairs. A list of bulletin board telephone numbers (by now almost inevitable) is also included. The book's impressive comprehensiveness may sometimes work against it. The number of subjects covered is such that many do not receive as much space as they deserve. For instance, insurance claims represent a major part of the paperwork generated in medical and dental offices. The author deals interestingly with the problems associated with insurance claims processing. What are lacking, however, are criteria for the selection of appropriate vertical applications software.

• **The College Student's Personal Computer Schoolbook.** By Bryan Pfaffenberger. 210 pages. Sybex. \$14.95, paper. Unlike other books on educational computer applications, this volume is

quite useful not only to students but also to anyone else who needs to crunch words and ideas onto disks. Naturally, there is a chapter on personal computer components, but it is brief (24 pages) and concise. In addition to chapters on the use of spreadsheets, database management systems, word processors and data bases such as BRS/After Dark and Knowledge, the Schoolbook discusses notetaking techniques, outlining, and study habits. Also featured are a hardware and software buyer's guide and a guide to online data bases.

Rather than just providing a shopping list, Pfaffenberger demonstrates how the various application programs may be customized for coursework use. There are illustrations and examples throughout. Hints and tips, some of which also apply to non-computerized learning, are boxed and highlighted.

• **Computer Animation Primer.** By David Fox and Michael Waite. 501 pages. McGraw-Hill. \$22.95, paper. If you are interested in animation, whether for personal computers or dedicated graphics computers, this book deserves your attention. It provides a thorough and comprehensive introduction to the concepts, tools and techniques of computer animation. The Primer also contains detailed information for creating your own animation sequences. It should be noted that the programs supplied and some of the topics covered in the book apply specifically to Atari computers; however, many of the programs can be translated and all of the information does relate to other micros as well.

The Primer is divided into two sections. The first focuses on the theory and applications; the second provides an opportunity for some hands-on experimenting. After giving a brief overview of animation, the authors discuss the various hardware components and introduce software and its applications. Some of the techniques described in this section are: windowing, three-dimensional representation, anti-aliasing and shading, and hidden line and surface removal. The tutorial section covers player-missile graphics, character set generation and animation, and color register animation. There is even a chapter on using machine language routines in Basic programs and another for creating a scrolling background.

The Primer's appendices include Basic program listings, source code listings for assembly language routines,

ATARI hardware and shadow registers, and graphics memory map modes. The book contains "flip art" and some of the finest computer art color photographs. The language may require some effort on the reader's part since it is a little technical at times.

• **The CP/M Plus Handbook.** By Alan R. Miller. 243 pages. Sybex. \$15.95, paper. Step-by-step instructions are combined with a reference section to provide a comprehensive guide for Digital Research's Version 3 of the CP/M operating system. The first two chapters are oriented to the beginning user, covering such general topics as the components of a microcomputer system and the use of write protection tabs, and such basic operations as the formatting and duplicating of disks, and creating, displaying and printing files.

The next chapter explains and provides examples of the six resident CP/M commands — TYPE, USER, DIR, DIRSYS, RENAME, and ERASE — and five transient ones — SETDEF, SHOW, SET, SUBMIT, and DEVICE. The chapter dealing with PIP, the file copying utility, gives special attention to wildcards, concatenation, and transferring disk files to peripheral devices. The fifth chapter is concerned with ED, CP/M's text editor. It demonstrates how to create and alter files, search text for a string of characters, and manipulate the Edit Buffer.

The sixth chapter provides a detailed discussion of the operating system's organization which could be helpful when writing assembly language programs. It covers memory allocation, the file control block, the console control processor (CCP), the basic input-output system (BIOS), and the basic disk operating system (BDOS). The remainder of the book contains appendices and a reference guide that lists a command's format, description, and use.

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PERSONALIZED REPORT FOR: **TRS-80**

November, 1984

Jeff Guinn, Technical Editor

* **NEW TANDY COMPUTERS ARE IBM COMPATIBLE**

Tandy Corporation has opened a new avenue of upward expansion for TRS-80 system users with the successive introductions of two 16-bit, IBM-compatible computers. The two new systems are the first of a family of MS-DOS computers configured to match, feature by feature, a range of IBM PC models extending from the hard-disk XT down to the low-end PCjr.

o **TANDY 1200 IS TOP OF THE LINE**

The first of the new Tandy systems to be introduced, the 1200 HD (Hard Disk) computer is claimed to be totally compatible with the IBM PC's 10-megabyte hard disk XTR version. The 1200 HD is base priced at \$2,999, approximately 40% less than the IBM PC XT's current suggested retail price of \$4,275. Otherwise, it closely matches the IBM unit, feature by feature. These features include 256K RAM, expandable to 640K, a single 360K, full-height, double-sided, double density 5-1/4 inch floppy disk drive and a 10-Mbyte hard disk housed in the desktop system unit. The 1200's 84-key detachable keyboard with tilt legs has the same layout as that of the IBM PC XT, save for shift keys which have been moved, for readier access, to approximately the positions they would occupy on a typewriter keyboard. The similarity between 1200 HD and PC XT hardware extends to microprocessors. Both use an Intel 8088 chip which operates at 4.7 MHz. An 8087 mathematics co-processor chip can also be added to the 1200's main logic board.

Feature by feature similarity also extends to operating systems. That used by the 1200 runs under MS-DOS version 2.11 which has almost exactly the same features as PC-DOS. Accordingly, nearly all applications programs written for IBM PCs run smoothly on the 1200. Software that makes direct calls to IBM ROM is an obvious exception. The computer may also stutter in a few cases before running a program. (Graphics packages are the best examples.)

Options initially provided by Tandy for the 1200 HD include a \$219 monochrome display adapter, and a \$299 graphics display adapter. Additional options from Tecmar fit in the 1200's five expansion slots. They are the \$795 Captain multi-function board which adds 384K RAM, and RS-232 port, a clock calendar, another printer port, and software, including RAM spooler, RAM disk and an appointment alert. The \$695 Graphics Master card provides 600 by 400 resolution in 16 colors and includes PC Paintbrush software.

Despite the change in name, the system comes, true to TRS-80 tradition, with a user manual which almost talks down to the reader.

o **TANDY 1000 FOR HOME/OFFICE USE**

After introducing the 1200 HD, Tandy has made an end run around the IBM PC range and emerged at the low end with the introduction of the Model 1000. Its price starts at \$1,200 for a model with 128K RAM and a single disk drive, but without a monitor - approximating the current prices of equivalent Apple IIc or IBM PCjr. configurations.

The Model 1000 comes with Basic, and Deskmate, a Tandy-developed integrated software package. Deskmate combines a word processing, database management, spread-sheet, communications and calendar functions. It requires 128K RAM. Deskmate will be bundled with the Tandy 1200 and 2000, probably around the start

of 1985. It may also be available for Models 4 and 4P. (Consumers who already own computers which run the program can purchase it separately for about \$249.)

Options available for the Tandy 1000 include a monochrome (\$160) or a color (\$550) monitor, a second internal disk drive (\$300), a hard disk controller (\$330), and successive 128K RAM upgrades to 640K maximum. A Model 1000 with 256K RAM dual disk drives and a monochrome monitor would be priced at approximately \$1,960. In contrast, an equivalent IBM PC configuration would cost (depending on current discounts) between \$2,500 and \$3,000.

* TRS-80 TIPS

o UNLOCKING MODEL 100 TRANSMITTALS

Model 100 users often claim that the machine has built-in blocking signals that are set off if improper procedures - such as dialing the wrong telephone number - are used in transmitting information via telephone from the 100 to a central computer. Actually, when a dialing error does occur, the Model 100 usually locks at the "enter" transmission signal and emits a loud beep. It continues to do so, without completing the phone connection, until the machine is shut off.

There are two methods that you can use to bring the Model 100 back to the main menu whenever a problem situation occurs, so that you can start over. First, whenever the Model 100 seizes up, you can return to the machine's menu by doing the following: strike the "break" key, then shift to strike the 9 or italics key; restrike the break key, and shift and strike the 0 or close italics key.

Secondly, when the Model 100 freezes due to incorrect dialing, you begin by using the above method to return to the main menu, then go into "Basic" mode. Type CALL 21179 and hit the ENTER key. This will clear the modem function and you can now redial to transmit your message from the Model 100 to your base computer.

o WHEN TO CAP

Most applications programs leave it up to you to type characters in upper or lower case, so long as spacings and special symbols are used exactly as prescribed and in the right positions. However, users of Radio Shack TRS-80 computers should always remember that, when giving TRSDOS commands, information should always be typed in upper-case if it appears that way in the user's manual. Lower-case information represents values entered by the user. Information set within brackets [] can optionally be in upper or lower-case.

o IGNORE AT YOUR OWN RISK

How can you go wrong? The Maintenance Division of Radio Shack has counted the ways. The most frequent causes of customer complaints about computer performance come, they say, from not following the rules below which are applicable to all TRS-80 Models:

USER="password" sets the user password;
OWNER="password" sets the owner password;
PROT=level sets the protection level for the user;
EXEC means execute only;
READ means read and execute;
UPDATE means update, read and execute;
REMOVE means remove, rename, rewrite, update, read, execute (total access except changing attributes with ATTRIB);
FULL means total access;
VIS specifies filespec as visible;
INV specifies filespec as invisible.

* PERSONAL FINANCE MANAGEMENT ON COCO 2

CoCo 2 (TRS-80 Color Computer Two if you want to be technical) comes with 16K to 64K RAM and an extended Basic option for \$119 to \$259. This can look mighty

tempting to anyone looking for a low-priced business computer. However, Tandy designed the system primarily for home education and games. Therefore, before acquiring the system, you should carefully evaluate its accompanying software.

At this time, there are six programs (described below) available from Radio Shack for running "financial" applications on the 64K version of CoCo 2. With a single exception, these programs are best suited, in most instances, for home personal finance management.

. Color File (\$24.95) - a pre-designed set of seven files for addresses, warranties, home investments, car maintenance, medical history, and resumes. As the file titles indicate, this program is primarily intended for simple business applications or home bookkeeping. You can also design some file forms, but you cannot develop anything more complex than simple A-B-C records or 1-2-3 bookkeeping. A cassette recorder is required.

. Graphics Pack (\$39.95) - six different chart formats - vertical and horizontal bar, pie and line charts. You can label individual chart lines. A cassette recorder is necessary to preserve the charts you have created on the screen.

Graphics Pack is too limited a graphics package to produce business-quality charts. However, it can come into its own for use by college students in preparing reports or for personal finance planning.

. Personal Finance II (\$34.95) - home budget management using 26 major expense categories - e.g. food, retirement funds, etc. A major advantage of this package is that you can review year-to-date expenditures overall or in different categories by pressing a single key. This is a good purchase if you enjoy dabbling with your CoCo 2. (Otherwise, a pencil and paper work just fine.)

. Speculator (\$34.95) - is the only CoCo 2 package with potential for business applications. This basic spreadsheet program calculates and displays results on demand. It can also answer "what if" questions for financial projections. Up to 99 rows and columns are available at one time. A cassette recorder is recommended.

. Color SCRIPSIT (\$34.95) - a word processing program which can be used to perform basic functions - editing, block deletions, inserting and moving text. However, it is not intended for sophisticated word processing. For some reason, the program works crankily and is apt to freeze up when just a single wrong key is struck. Because the program is largely used to create comprehensive on-screen displays rather than output printouts, use of a printer is optional.

. Color Screen Print Utility (\$9.95) - add-on software for generation of multi-color printouts of color graphics produced by the various CoCo 2 graphics programs. (Since CoCo 2 graphics are not that spectacular to begin with, there is some question as to the need to enhance their color reproduction.) This program uses a color ink-jet printer, a cassette recorder, and requires 16K Extended Basic.

* TRS-80 PROGRAMS

o TWO FROM ALPHABIT

Two new utility programs have been introduced by AlphaBit Communications, Inc. for TRS-80 Model I, III and 4 computers. The LazyComm communications program allows configuring for any host system, provides auto log-on and auto dial with a smart modem, and keeps track of time on-line. LazyComm sends or receives information at baud rates of up to 9600. The program can also be integrated with AlphaBit's Lazy Writer word processor to edit text received over the phone and combine it with other files. Its introductory price is \$34.95. The Zeus Editor/Assembler is priced at \$79.95.

AlphaBit has also reduced the price of the MULTIDOS 1.6 disk operating system

to \$59.95. First written for the TRS-80 Model I as a replacement for Radio Shack's TRSDOS, MULTIDOS can transfer files between most TRS-80 operating systems. It comes with several utility programs and 40 library commands. Alpha-Bit Communications, Inc., 13349 Michigan Ave., Dearborn, MI 48126. 313/581-2896.

- o PUZZLE MASTER

Using PUZZLE MASTER, an educational software tool, you can create crossword, word-find, anagram, and word-guess puzzles from lists of words and clues stored on disk-ettes. Teachers can store words and clues to produce puzzles which precisely match their curriculum. Topical word-list diskettes can be purchased separately. \$89.00. Shenandoah Software, P.O. Box 776, Harrisonburg, VA 22801. 703/433-9485.

- * SOFTWARE FOR THE 2000

- o WORDSTAR PLUS

WordStar, the first (and, many say, still champion) word processing program with significant sophistication and productivity is now available in Radio Shack outlets for the Tandy Model 2000 computer. Also available is the WordStar Professional package which bundles together with WordStar the MailMerge merging program; the CorrectStar spelling checker which utilizes three separate dictionaries; and the StarIndex utility. The cost of the package is \$449. WordStar by itself is \$299, or separately - MailMerge, \$229; CorrectStar, \$179; StarIndex, \$179.

- o DRAFTING SOFTWARE

The AutoCAD drawing program will be available for the Tandy Model 2000. AutoCAD, a multi-utility, two-dimensional system is claimed to be - with over 8,000 installed copies worldwide - the most widely used microcomputer drafting package. It may be ordered from any of the over 9,000 Radio Shack outlets worldwide through Tandy's next-day shipment Express Order Software service. The price of the program is \$2,000. Discipline-specific symbol libraries and micro-to-mainframe translator packages are also available.

- * WHOLE EARTH SOFTWARE CATALOG. \$17.95. Quantum Press/Doubleday

Must reading for any TRS-80 computer owner, this book features reviews of over 2,000 applications programs. They include most of the Tandy/Radio Shack software line and many IBM PC-compatible programs which can now be run in their original MS-DOS version on the Tandy 1200 HD computer. The Catalog also features capsule reviews of the major personal computing magazines and of a limited number of hardware units.

The software reviews are divided into various functional categories, each featuring a roster of "best buy" recommendations. For instance the Managing Software (business applications) list is headed by the Open Access integrated package from Software Products International (available in Radio Shack stores, \$595). This software system runs on the Model 2000 and is being considered for TRS-80 Models III, 4 and 16. It combines database, spreadsheet, word processing, graphics, communications and appointment calendar functions. Word processing capabilities include block moving and mass mailing.

Whole Earth points out that the package is complex. (Personal experience indicates that a full week is needed to master preliminary applications). Also, it lacks plus-40 character fields, and existing file formats are difficult to redesign. However, in balance, it rates Open Access "an incredible value for the price." It is not for computer novices, but it will provide everything a small businessman will need.